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DOCKET FILE COPY ORIGINAL

January 18, 1994

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Re: GEN Docket No. 90-314
Ex Parte Presentation

Dear Mr. Caton:

On Friday, January 14, Apple Computer, Inc. ("Apple") provided a copy of the attached documents to Mr. Brian Fontes and Mr. Byron Marchant. Two copies of this presentation are hereby submitted for the public record in this proceeding, pursuant to 47 C.F.R. § 1.1206(a)(1). Due to the fact that the attached materials were provided to Mr. Fontes and Mr. Marchant very late in the day, Apple was unable to file a copy with the Secretary on January 14, as required by the Commission's Rules, and therefore is submitting this notice on the first business day following submission of the written presentation.

If there are any questions in this regard, please contact the undersigned.

Sincerely,

Henry Goldberg

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MEMORANDUM

TO: B. FONTES/B. MARCHANT

FROM: HENRY GOLDBERG

RE: Unlicensed PCS

DATE: January 14, 1994

I understand from Ed Lavergne that, when he and Robert Holleyman of the Business Software Alliance met with each of you the other day, you both indicated that no one had shown why manufacturers of "nomadic" devices could not begin by clearing and operating in the 10 MHz of lightly loaded spectrum (1910-1920 MHz) in the data sub-band. The theory would be that the manufacturers could get started there and use the revenues from those operations to fund clearing the more crowded portion of the sub-band (1900-1910 MHz) later.

Apple dealt with this point in its November 8, 1993, comments on its Emergency Petition (copy attached, pp. 6-7). Because the microwave receivers in the adjacent channels have very wide RF and IF pass bands, PCS signals in the data sub-band will interfere with those adjacent channel receivers, even after the co-channel microwave stations have been removed from the sub-band.

A TIA task force is looking to see if that interference susceptibility could be limited to something like 2.5 MHz or 4 MHz extending into the otherwise

cleared data sub-band. The microwave community seems comfortable with "only" 4 MHz (each side) as a reasonable objective, but a large number of the microwave receivers will require modification even to reach that number. There is also a proposal for a 2.5 MHz guard band. A choice between either one is somewhat arbitrary and depends largely on how many adjacent channel microwave stations one is willing to modify.

If a 4 MHz guard band is required, the resultant usable spectrum in the "10 MHz" data sub-band would be only 2 MHz. If the additional cost of achieving a 2.5 MHz guard band appears practical, 5 MHz would be available. No manufacturer, however, would undertake the cost and face the delay of band clearing to end up with merely 2 to 5 MHz of usable spectrum, which, at best, is half of what Apple said in its original Petition for Rulemaking is the minimum amount of spectrum necessary to get started. This contrasts with 12 MHz of usable spectrum for nomadic devices if 1910-1930 MHz were allocated for this purpose and all co-channel microwave stations were cleared.

I have attached some charts reflecting the effects that a 4 MHz guardband would have on various allocation and band clearing scenarios. Obviously, clearing of both the co and adjacent channel stations would be preferable and ultimately necessary; the guard band approach, however, appears to be the only viable alternative until then, if service is to begin at all. BSA and Apple would like to make a joint return visit to go over this with you in more detail.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of	)	
	)	GEN Docket No. 90-314
Amendment of the Commission's	)	RM-7140, RM-7175, RM-7618
Rules to Establish New Personal	)	
Communications Services	)	

To: The Commission

COMMENTS OF APPLE COMPUTER, INC.

James F. Lovette
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November 8, 1993

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B. Clearing adjacent channel microwave stations from the data sub-band will complicate and increase the cost of deployment of Data-PCS.

Just as the "last link" of co-channel microwave stations must be removed from the band before nomadic data devices can be deployed, the band can be used for such devices only to the extent that wideband microwave receivers in adjacent channels are not adversely affected.[13] The impact of PCS devices upon wideband microwave receivers in adjacent channels has been brought to the Commission's attention previously in regard to licensed PCS, but the full impact with respect to unlicensed services has not been considered in this proceeding, although Apple has raised it.[14]

Clearing of frequencies nationwide for nomadic devices must provide for removing or narrowing the protection zone of these adjacent "last links" or restricting the operation of nomadic devices only to portions of their allocated band. Proposals for "guard bands" of 4 MHz each (within the bands allocated for unlicensed), for example, in which non-coordinated PCS operation would be prohibited, are being considered by *ad hoc* industry groups.[15] At this juncture, no consensus has been reached about the validity or the width of required guard bands, but, obviously, any such guard bands will reduce the size of the usable nomadic unlicensed band.

---

[13] Many microwave receivers have bandwidths substantially wider that the emission envelopes of their associated transmitters. The degree of increased bandwidth varies with the function — 600 channel, 45 MBps and older analog links often have the widest receivers. This characteristic is taken into account in intra-service (microwave-among-microwave) frequency coordination. A PCS device in what is referred to as an adjacent channel, however, must be considered co-channel to the extent its transmit envelope overlaps the adjacent-channel microwave receiver passband. When coordinating non-nomadic PCS devices, it should be appropriate and possible to include such considerations.

[14] The Commission dealt with one aspect of the problem by indicating that stations in adjacent channels assigned to licensed services will be subject to mandatory negotiation and relocation on the same timetable as stations in the channels assigned to unlicensed services, if those stations must be moved to accommodate unlicensed devices. Order at n.108.

[15] A guardband of 4 MHz, for example, next to each occupied microwave channel, would not be in conflict with some findings and discussions in the industry. The 4 MHz figure is not a proposal or a guideline, but is offered only as a basis for examining the issue. It should be noted, however, that implementation of a guard band scheme is not feasible under the "packing rules" adopted in the Order. Those packing rules require most stations to search first for available frequencies nearest the band edges and employ them if no usage is detected. To avoid precluding a guard band solution to the adjacent channel problem, Apple will request reconsideration of the "packing rules" in a subsequent submission on the Order.

If the lightly loaded 1910-1920 MHz segment now allocated to data services is initially cleared of all co-channel stations, and a 4 MHz guard band is required within each edge of the band until the "last adjacent link" has also been cleared, the resulting nomadic data band would be only 2 MHz. However, if the entire 1910-1030 MHz band were assigned to asynchronous operations, 12 MHz would be available for nomadic computing devices after all co-channel links were cleared, even with the 4 MHz guard bands.

C. The combined effect of the co- and adjacent last link clearing problem will jeopardize the development of Data-PCS.

In light of the above, the present allocation of 1900-1920 MHz for asynchronous technologies presents this scenario:

> The computer industry must somehow fund, in advance and without any assurance of timely completion, the retuning and relocation of approximately 212 co-channel microwave stations from the 1910-1920 MHz band, even if it does nothing with the 681 co-channel stations in the other portion of the asynchronous sub-band. Until the last of the 212 stations is removed or retuned, no nomadic devices can be deployed.
>
> The up-front cost of clearing the 1910-1920 MHz band could be as much as $60,000,000.[16]
>
> Upon completion of this relocation process and in the absence of a parallel clearing of the "last link" from the lightly loaded adjacent voice band at 1920-1930 MHz[17] and from the adjacent data band at 1900-1910 MHz, ***only two MHz*** of cleared spectrum would be available for nomadic data devices if, as expected, guard bands are required.

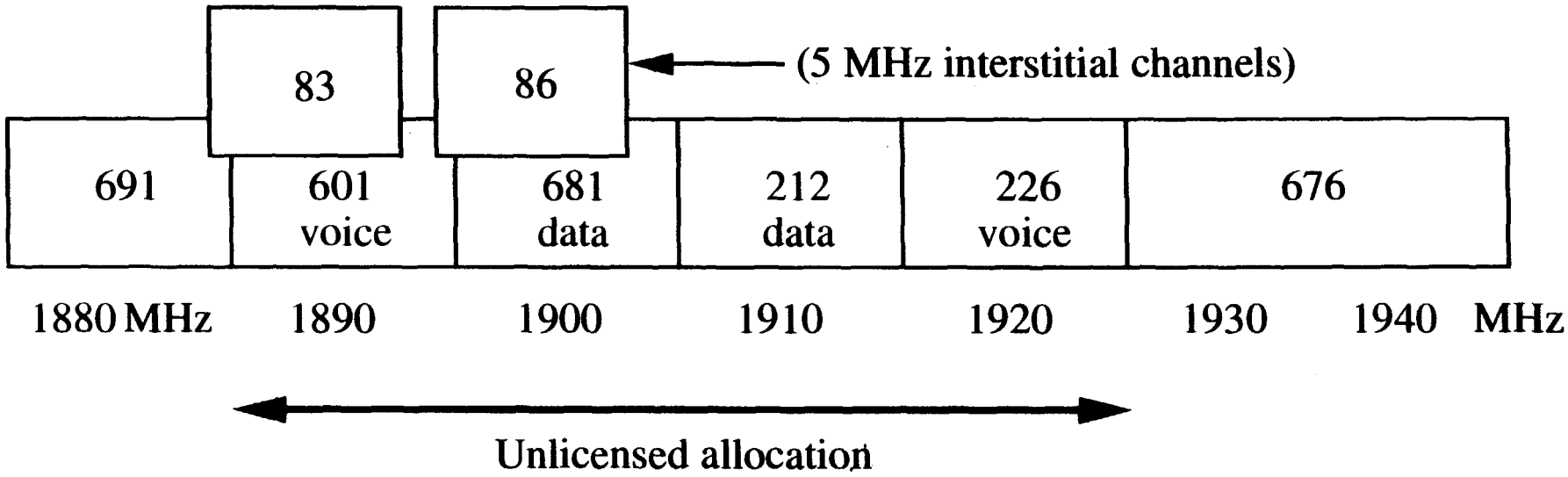
---

[16] This assumes that 212 stations must be relocated at an average cost of $285,000 per station. While in-band retuning offers a more cost effective alternative, the Third R&O calls into question this lower-cost option for any stations other than public safety stations. Apple and others are seeking removal of this prohibition when all affected parties consent. See, e.g., Apple's Petition for Reconsideration, ET Docket No. 92-9, at 6-10 (filed Sept. 13, 1993).

[17] No plan for such "last link" clearing has been proposed by UTAM or others. In fact, UTAM's filings to date have concentrated on coordinated deployment.

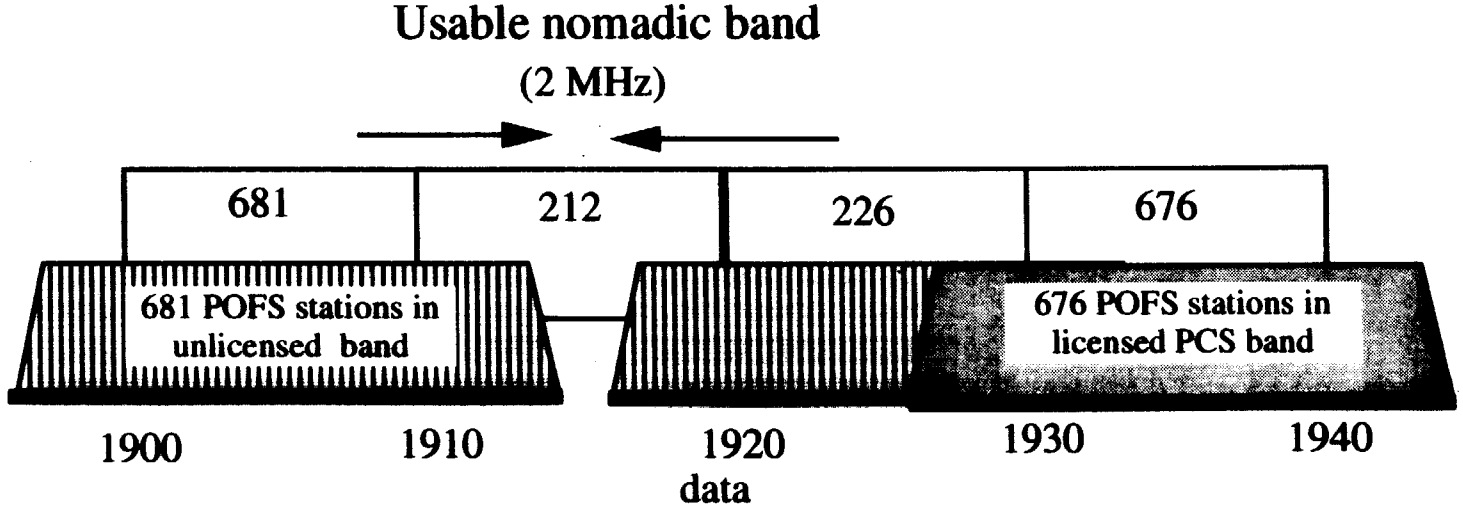
EFFECTS OF ADJACENT CHANNEL USERS ON BANDWIDTH AVAILABLE FOR NOMADIC DEVICES.

Present band occupancy: # of microwave receivers in each channel.



ALTERNATIVE A . 1900 – 1920 IS ASSIGNED FOR DATA. (PRESENT FCC SCHEME)

CASE 1 UTAM clears all 212 stations from the data band, but does not clear ***every*** microwave link in the adjacent PBX band. If a 4 MHz guard band is required to protect them, 2 MHz are usable for nomadic data.

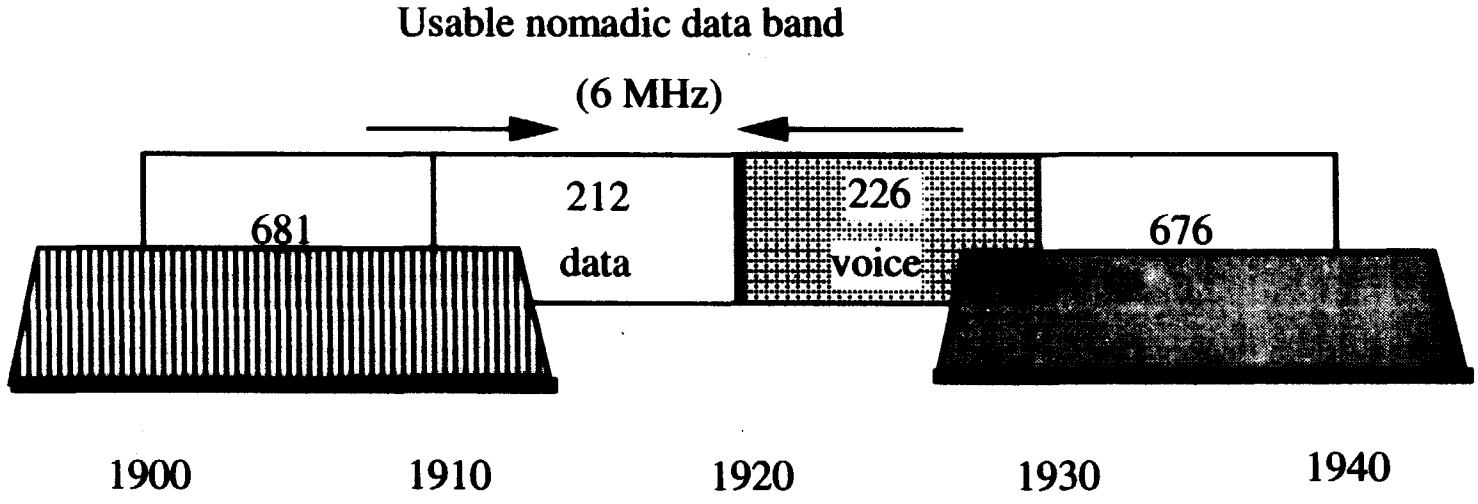


Relocating 212 stations provides two MHz for nomadic data.

Note: because emission limits prevent operation right up to the edge of the band, the actual usable bandwidth will be diminished as much as 1/2 MHz on each side. This is true in all cases.

ALTERNATIVE A . (CONTINUED) 1900-1920 IS ASSIGNED FOR DATA. (PRESENT FCC SCHEME)

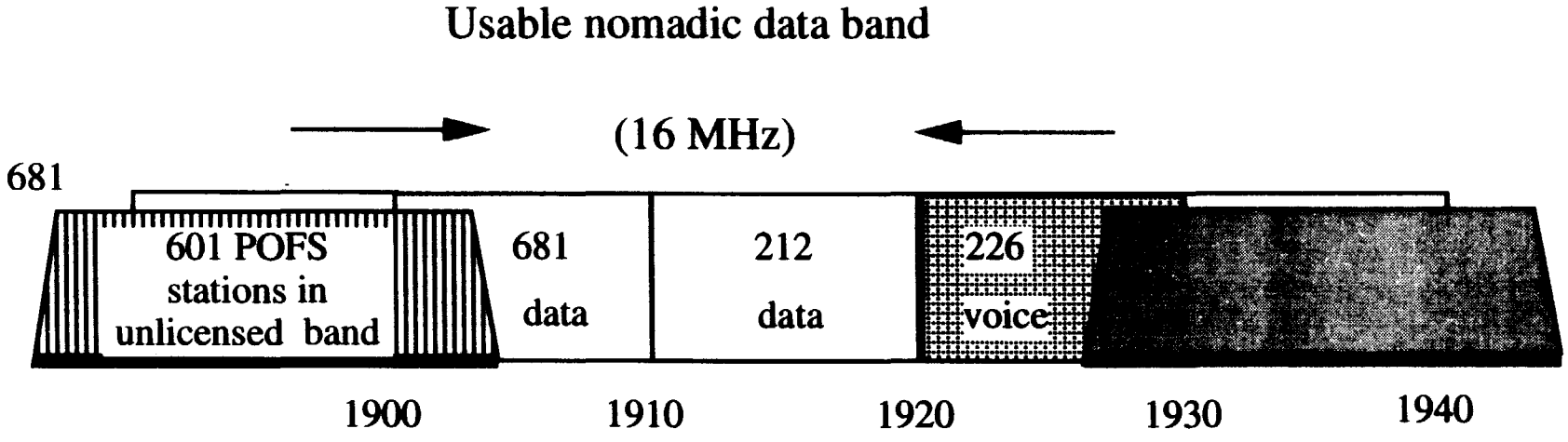
CASE 2 UTAM clears all 438 stations from the lightly loaded voice and data bands, but does not clear ***every*** microwave link in the adjacent data band. 6 MHz are usable for nomadic data.



→ **If 438 stations are relocated, 6 MHz are available for nomadic data.**

ALTERNATIVE A . (CONTINUED) 1900-1920 IS ASSIGNED FOR DATA. (PRESENT FCC SCHEME)

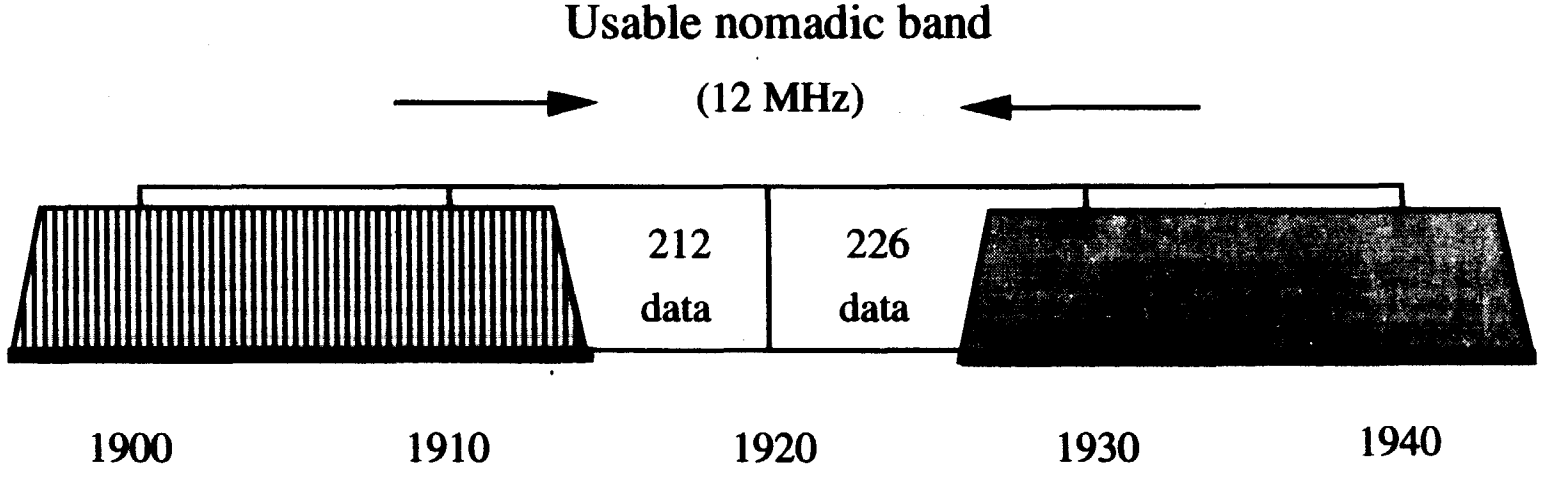
CASE 3 UTAM clears all 438 stations from the lightly loaded voice and data bands, and clears 681 stations from adjacent unlicensed data channel. 16 MHz are usable for nomadic data.



1119 stations must be moved to provide 16 MHz for nomadic data.

ALTERNATIVE B: 1910-1930 IS ASSIGNED FOR DATA. (PROPOSED BY APPLE AND OTHERS)

UTAM clears all 438 stations from the lightly loaded band, but does not clear ***every*** adjacency in isoc band.12 MHz are usable for nomadic data.



If 438 stations are relocated, 12 MHz is available for nomadic data.